

UPS Battery Size Calculator

Provides a preliminary UPS battery energy and amp-hour estimate from load power, target runtime, conversion efficiency, usable capacity, and battery voltage.

Generated October 10, 2026

<https://www.elecatrix.com/solar-backup-power/ups-battery-size-calculator/>

Inputs

Input	Value	Unit
Load power	500	W
Target runtime	2	hours
Conversion efficiency	90	%
Usable battery capacity	80	%
Battery voltage	48	V

Results

Result	Value	Unit
Load energy	1000	Wh
Required battery energy	1388.8889	Wh
Required battery capacity	28.9352	Ah
Efficiency factor	0.9	x
Usable capacity factor	0.8	x

Calculation details

Detail	Value	Unit
Calculation basis	Load energy equals load watts multiplied by runtime hours. Required battery energy divides that load energy by efficiency and usable-capacity factors.	
Screening boundary	UPS battery sizing arithmetic only; no battery model, aging, temperature, discharge-rate curve, charger, listing, or manufacturer runtime approval is made.	

Formulas

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$$E_{\text{load}}[\text{Wh}] = P_{\text{load}}[\text{W}] \times t_{\text{runtime}}[\text{h}]$$

$$\eta = \frac{\text{frac}\eta_{\%100}}{\text{quad } c_{\text{usable}}} = \frac{\text{frac}c_{\text{usable}}}{\%100}$$

$$E_{\text{battery,required}}[\text{Wh}] = \frac{\text{frac}E_{\text{load}}[\text{Wh}]\eta}{c_{\text{usable}}}$$

$$C_{\text{battery,required}}[\text{Ah}] = \frac{\text{frac}E_{\text{battery,required}}[\text{Wh}]}{V_{\text{system}}[\text{V}]}$$

Warnings and limitations

This is UPS battery sizing arithmetic only. It does not certify UPS model selection, battery aging, discharge curves, temperature correction, listing, or code compliance.